Armed Forces College of Medicine
AFCM

كلية الطب بالقوات المسلحة

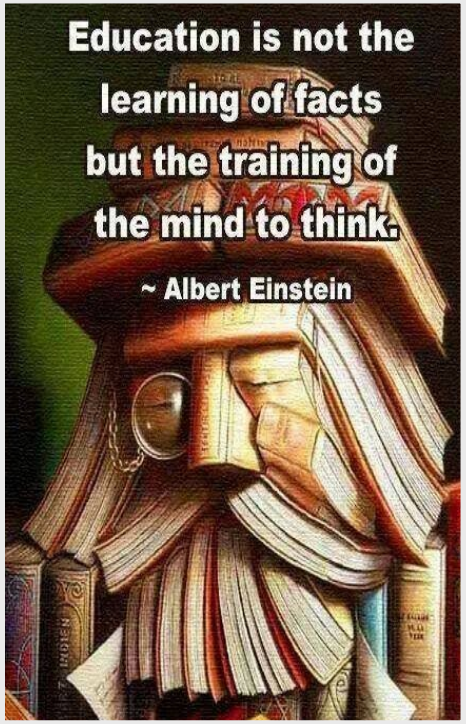
Armed Forces College of Medicine

Year 2
Endocrine and genitourinary module

Clinical Integrated Cases

Basic Science Principles for **Clinical Reasoning**

1- Critical thinking
2- Introduction to common forms of disease
3- Apply basic knowledge in a realistic clinical scenario.
4- Interpersonal skills-(share and apply your knowledge) communication...patient safety


Education is not the learning of facts but the training of the mind to think.
~ Albert Einstein

Case co-ordinators
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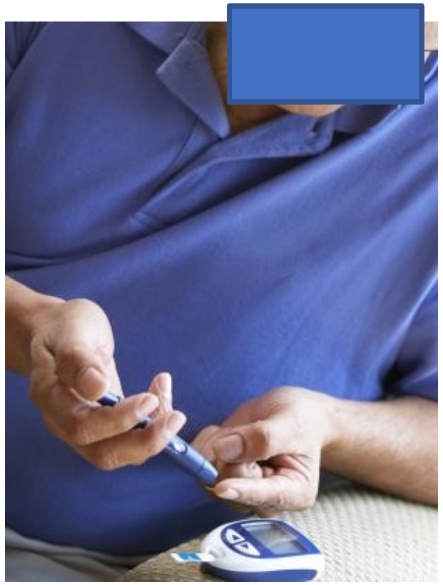
Sharing Departments

- **Internal medicine**
- **Physiology**
- **Histology**
- **Biochemistry**
- **Pathology**
- **Pharmacology**
- **Microbiology**

Case swollen legs

My legs are swollen

Mr. Magdy is a **40** year old man who works as an accountant in a bank. He lives in Saray-elkoba with his wife and 2 children. Magdy has been **diabetic** for 15 years and he is under insulin therapy.



The blood glucose **has not been controlled over the past 10 years**.

My legs are swollen

Magdy noticed **swelling of both lower limbs** for the last 3 months. His wife told him that he must consult an internist.

The doctor asked Magdy if he suffers from **dyspnea on exercise** or on sleeping flat.
The doctor also asked about previous history of **jaundice**.
No stool abnormalities

My legs are swollen

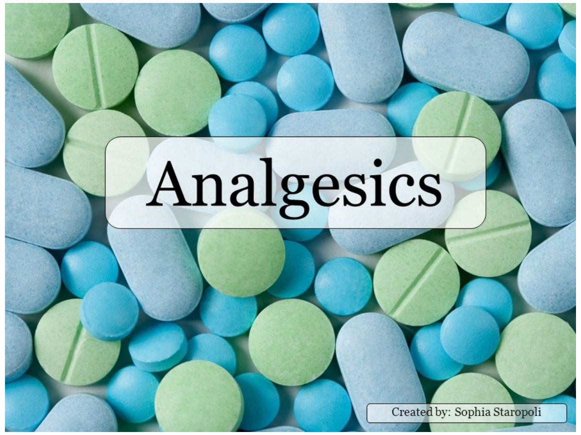
The doctor asked about history **puffy eyelids** or **frothy urine**.

The doctor asked about history of **renal stones** or recurrent **urinary tract infection** (**dysuria and frequency of micturition**).

The doctor asked him if he take any **drugs**.

Magdy mentioned that he occasionally take **analgesics (NSAID)** if he feels headache or joint pains.

- No positive family history



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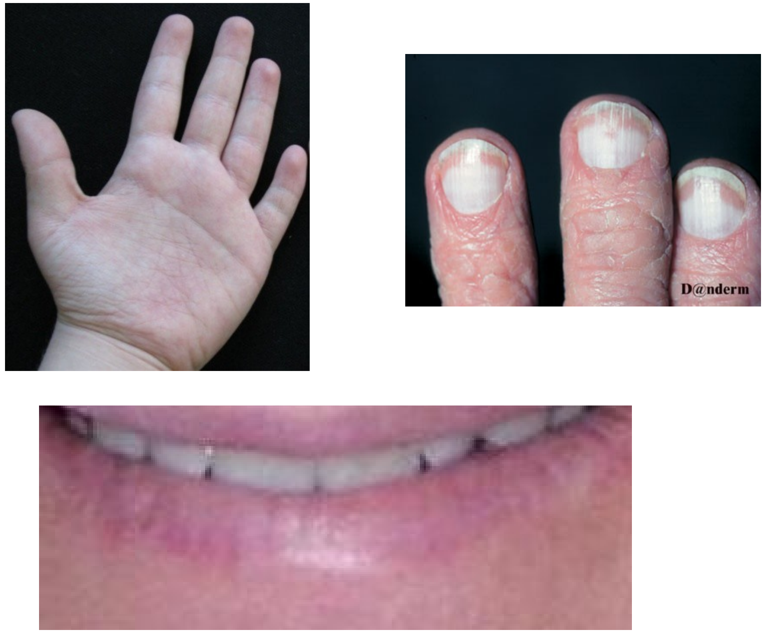
My legs are swollen

General Examination

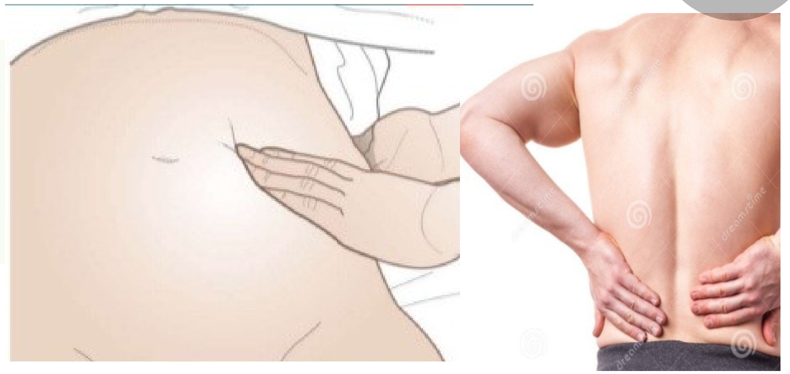
Vital signs examination:
Pulse was 75/min
Blood pressure: **150/100**
Temperature: 37°C

The doctor noticed that Magdy appeared **pale** and examined his lips, nails and palms.
No jaundice nor cyanosis



My legs are swollen

Abdominal examination showed **no tenderness in the loin** region.



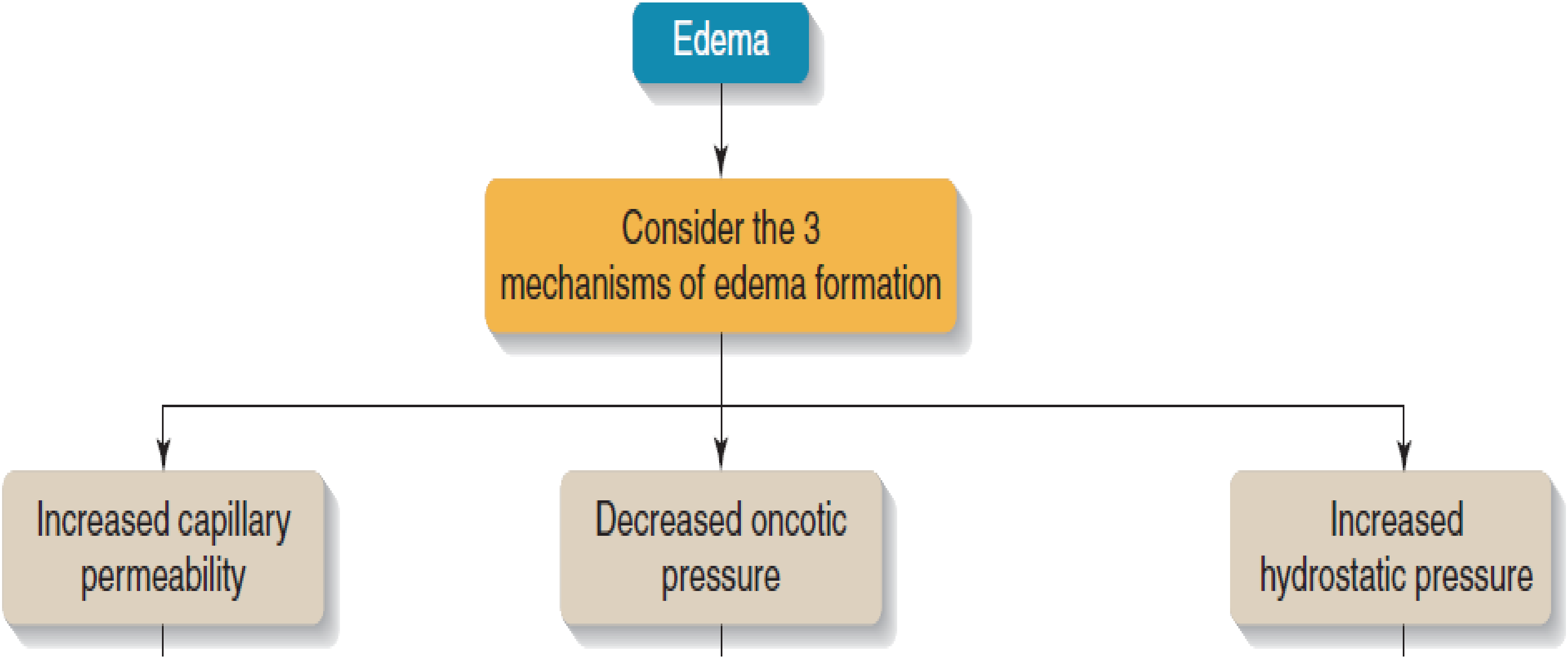
Lower limb examination showed **bilateral** **pitting edema** reaching mid leg.

The doctor told Magdy that his diabetes was not well controlled and has affected his kidney and so certain investigations must be done. A blood sample was drawn, and midstream urine analysis was done.

The doctor should ask for fundus to look for diabetic retinopathy as he is diabetic for 15 years

Magdy 40y diabetic noticed **swelling of both lower limbs** for the last 3 months.

What is the differential diagnosis?



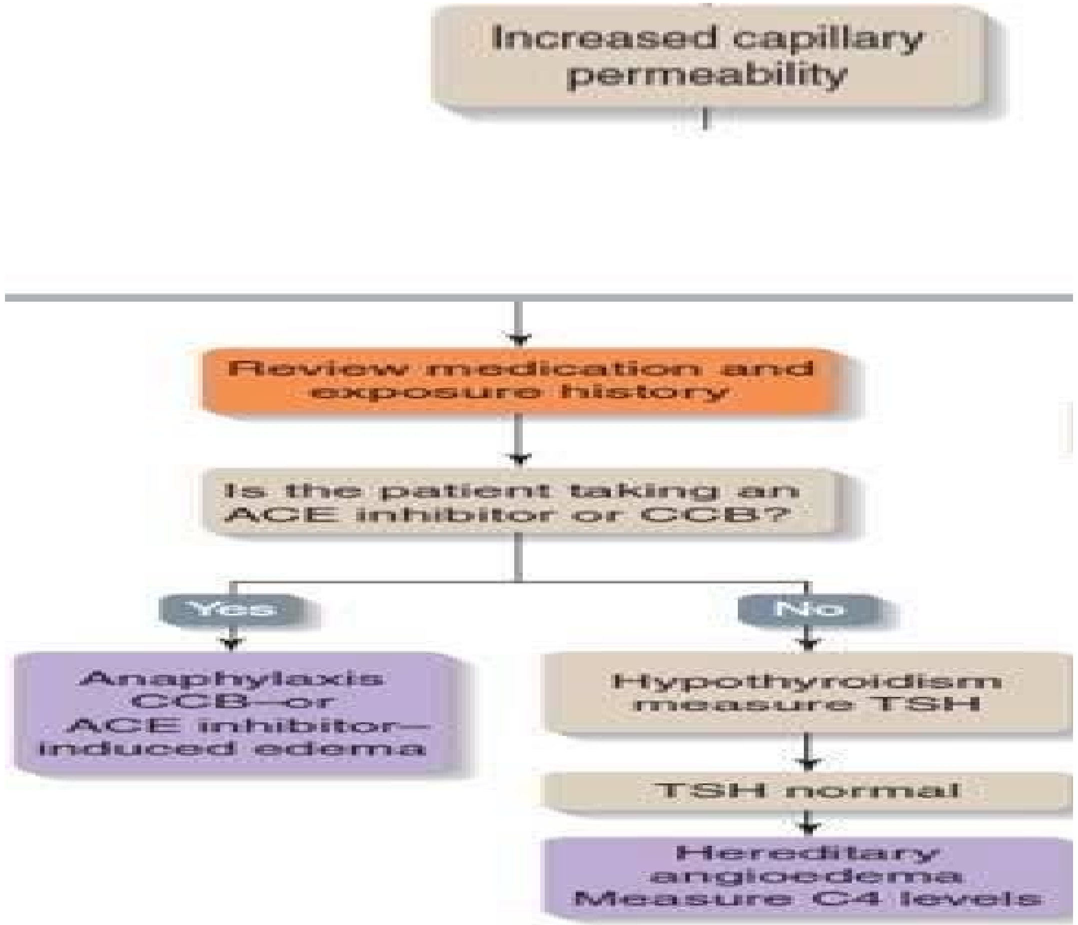
Edema

Consider the 3 mechanisms of edema formation

Increased capillary permeability

Decreased oncotic pressure

Increased hydrostatic pressure



Increased capillary permeability

Review medication and exposure history

Is the patient taking an ACE inhibitor or CCB?

Yes

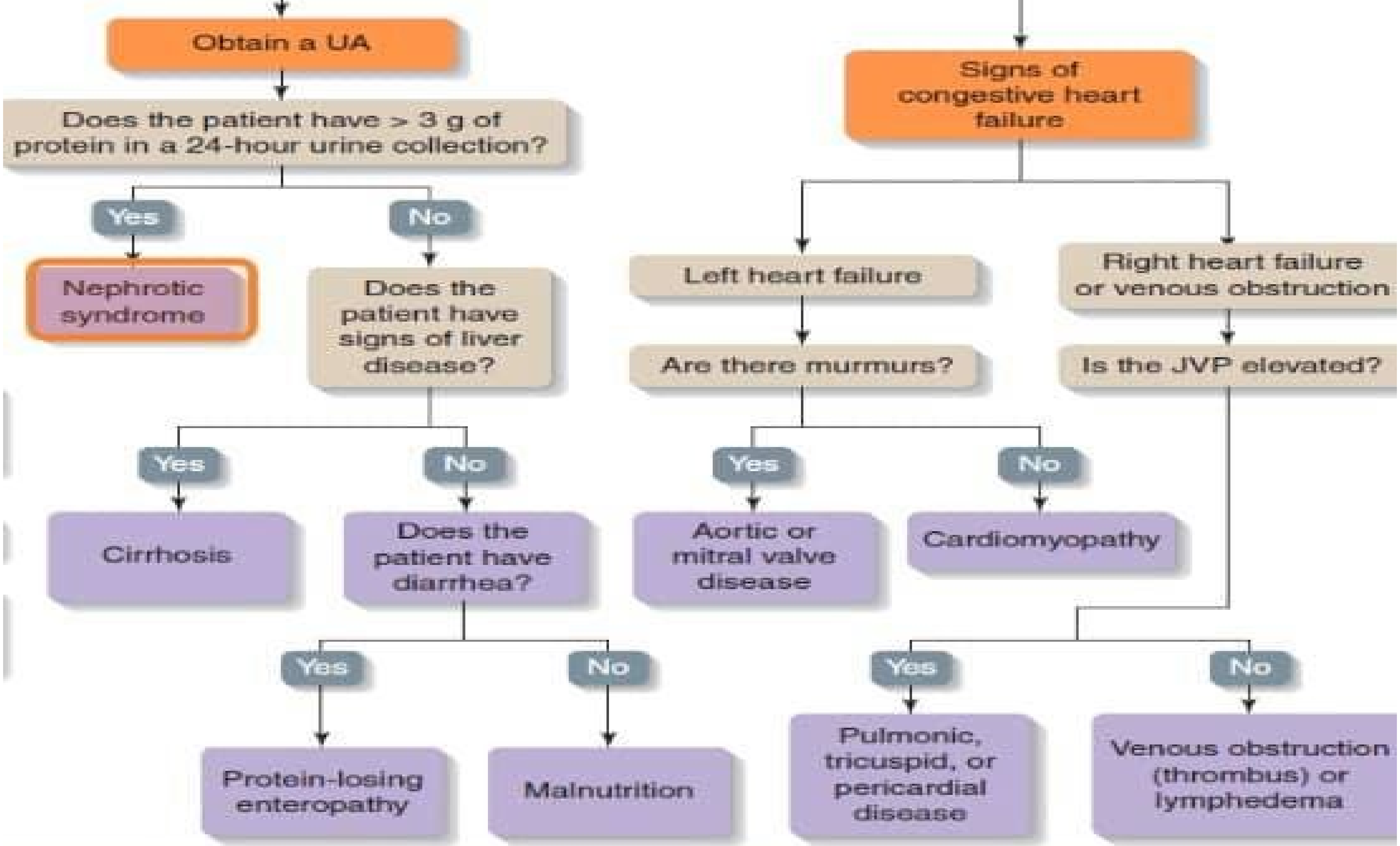
Anaphylaxis
CCB—or
ACE inhibitor—induced edema

No

Hypothyroidism
measure TSH

TSH normal

Hereditary angioedema
Measure C4 levels



Obtain a UA

Does the patient have > 3 g of protein in a 24-hour urine collection?

Yes

Nephrotic syndrome

No

Does the patient have signs of liver disease?

Yes

Cirrhosis

No

Does the patient have diarrhea?

Yes

Protein-losing enteropathy

No

Malnutrition

Signs of congestive heart failure

Left heart failure

Are there murmurs?

Yes

Aortic or mitral valve disease

No

Cardiomyopathy

Right heart failure or venous obstruction

Is the JVP elevated?

Yes

Pulmonic, tricuspid, or pericardial disease

No

Venous obstruction (thrombus) or lymphedema

The doctor asked Magdy if he suffers from **dyspnea on exercise** or on sleeping flat. The doctor also asked about previous history of **jaundice**

Why?

- Dyspnea on exercise or on sleeping flat (orthopnea) to exclude cardiac cause of oedema
- Jaundice : hepatic failure with reduced formation of albumin.

The doctor asked Magdy about History of frothy urine and puffy eyelids
History of renal stones and recurrent UTI.
Family history

Why?

- Frothy urine with puffy eyelids : nephrotic syndrome.
- Recurrent pyelonephritis, renal stones,
- family history of diseases like polycystic kidney , as a cause of renal failure which will cause hypervolemia and oedema.

What is the importance of drug history in Magdy?

- Drugs: like ca channel blockers may cause ankle oedema, or drugs that may cause nephrotic syndrome like gold and penicillamine or nephrotoxic drugs that may cause chronic renal failure .

What investigations do you suggest to be done?

Welcome back

My legs are swollen

Investigations:

Patient has long standing Diabetes so the physician has to look for

- Fundus examination
- HBA1C
- Lipid profile

Patient has lower limb edema so the doctor has to look for

- Proteins in urine and if present he has to estimate total proteins in 24 hours urine, by either 24 hours urine collection for proteins or Albumin/creatinine ratio in one urine sample.
- Serum albumin
- Liver functions
- TSH

My legs are swollen

As the patient has long standing diabetes , hypertension and history of nephrotoxic drugs (non steroidal anti-inflammatory) intake, We have to keep renal impairment in mind so we need :

- Renal function (urea, creatinine, and GFR)
- Electrolytes.
- Calcium and phosphorus.
- Bicarbonate.
- CBC.

My legs are swollen

The doctor asked for:
CBC
-Fasting and postprandial blood glucose level
HbA1c
Serum creatinine
Urea
Fundus examination
Lipid profile
Proteins in urine

- Serum albumin
- Liver functions
- TSH

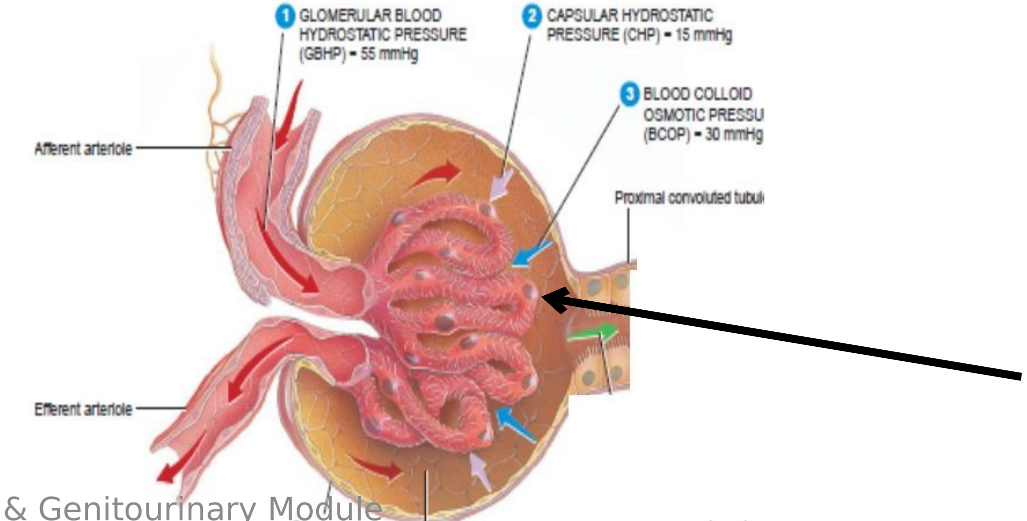
My legs are swollen

Results of the investigations showed:

HbA1C: 11 (N<6.5)

Serum creatinine: 2 mg/dl (N: 0.7 – 1.4mg/dL).
Blood urea: 60mg/dl (N:20-40mg/dl)

GFR: 40 ml/min.



1 GLOMERULAR BLOOD HYDROSTATIC PRESSURE (GBHP) = 55 mmHg
2 CAPSULAR HYDROSTATIC PRESSURE (CHP) = 15 mmHg
3 BLOOD COLLOID OSMOTIC PRESSU (BCOP) = 30 mmHg
Afferent arteriole
Proximal convoluted tubul
Efferent arteriole

My legs are swollen

Hb:	**9gm/dL** (N 12-16gm/dL)
Serum Ca:	**7.5mg/dl** (N: 8.5-10.5)
Serum K:	**4.5meq/l** (N: 3.5-5)

Urine analysis: showed 2+ proteins.

The doctor asked for 24 hours for protein or P/C ratio that showed :

proteinuria 2000mg/24hr (N < 200 mg/24hr).

My legs are swollen

Other investigations needed:

Sodium: 136 meq/ L N: (135-145mEq/L)

Serum Albumin : 3 g/dL N: (3.4-5.4 g/Dl)

Corrected calcium = serum ca +0.8 (4-serum albumin)

= 7.5+ 0.8*(4-3)= 7.5+(0.8)

=8.3 mg/dl

Phosphorus : 4mg/dL N: (2.4-4.5mg/dL)

HCO_3: 18mEq/L N: (23- 30 mEq/L)

Lipid profile : high total and LDL cholesterol high triglycerides, Low HDL

My legs are swollen

The doctor prescribed to Magdy:

- **lisinopril**
- **Modified the insulin dose**

The doctor advised Magdy to:

- **Avoid intake of analgesics**
- **Diet** should be of **low salt** and **low protein** content.

He emphasized on Magdy to **follow up** after 3 months.

What is the provisional diagnosis of Magdy?

6- What is the mechanism of edema in renal disease?

Vital signs:
Pulse: 75/min
Blood pressure: **150/100**
Temperature: 37^{o}C

7- Explain the rise in blood pressure

8- What are the cells involved in renin-angiotensin system?

The doctor noticed that Magdy appeared pale and examined his lips, nails and palms.

Where to look for pallor?

- Pallor in lips, tongue , conjunctiva and palms.
- The patient has white not pale nails and this can be seen in patients with hypoalbuminemia.

Explain the pallor occurring in renal disease?

Abdominal examination showed no tenderness in the loin region.

9- Describe the surface anatomy of the kidney

HbA1C: 11 (N<6.5)

10- What is HbA1c?

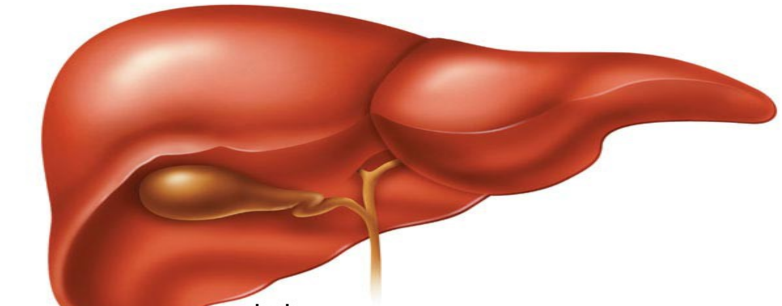
What the significance of its increase?

Serum creatinine: 2mg/dl (N: 0.7 – 1.4mg/dL).
Blood urea: 60mg/dl (N: 20-40mg/dl)

What is blood urea and serum creatinine?

Which is more accurate?

1- UREA



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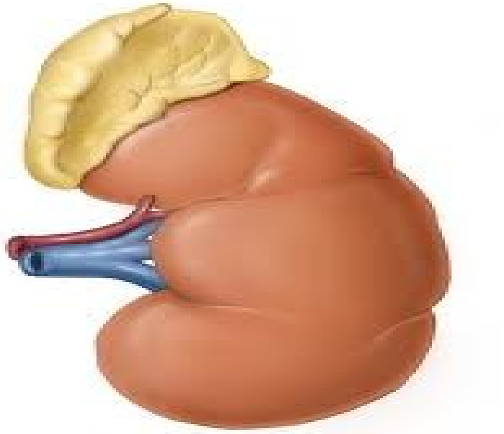
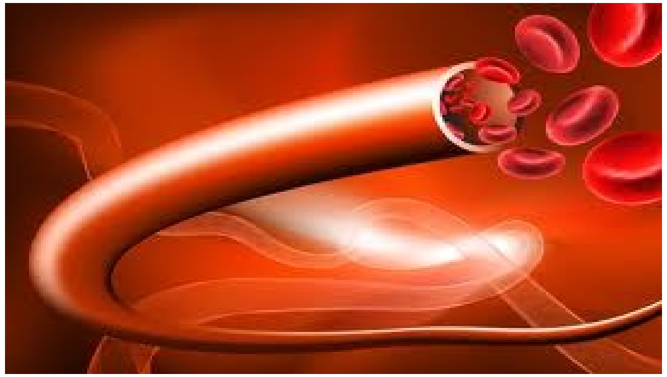
Urea is a nitrogen containing compound formed in the liver as an end product of protein metabolism



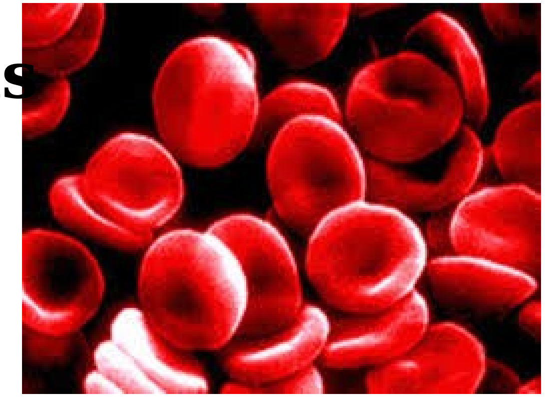
Urea filtered in the kidney



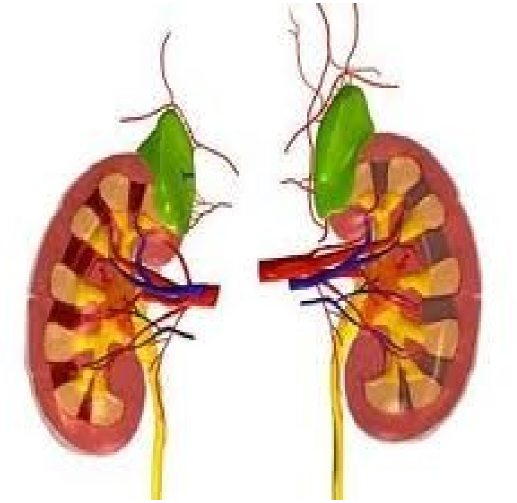
Urea pass in the

Creatinine

- Creatinine is a non-protein waste product of creatine phosphate metabolism by skeletal muscle tissue
- Creatinine production is continuous and is proportional to muscle mass.



Creatinine passes in the blood



Creatinine is filtered by the kidney

Normal value of serum creatinine:

Adult males: 0.7 - 1.4 mg/dl: values are slightly higher in males due to larger muscle mass.

Adult females: 0.6 - 1.1 mg/dl.

Children: 0.2 - 1.0 mg/dl

High BUN value may be caused by:

- kidney diseases.
- Blockage of the urinary tract.
- Low blood flow to the kidneys .
- High-protein diet, tissue damage and bleeding in the gastrointestinal tract.

Low BUN value may be caused by:

Very low protein diet, malnutrition, or severe liver damage.

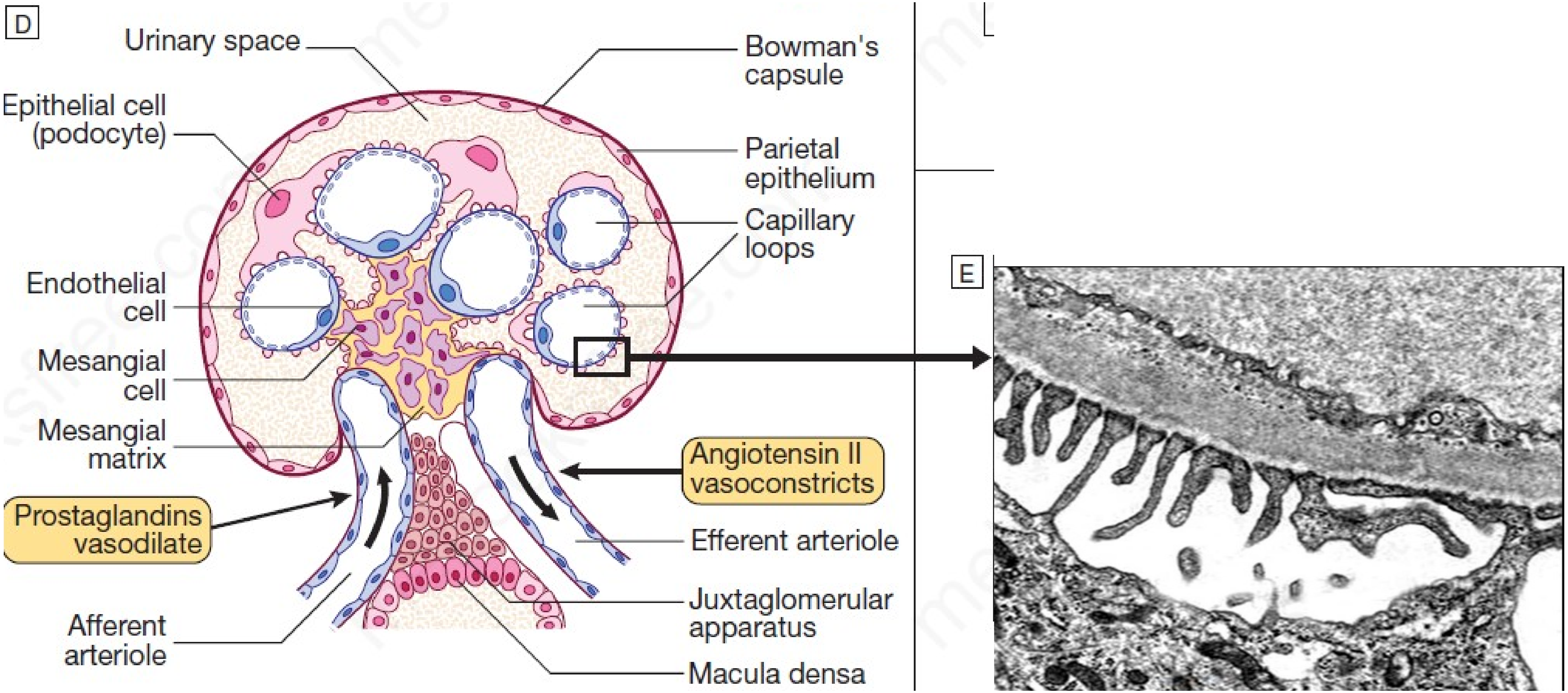
GFR: 40 ml/min.

10-a What is the normal GFR?

b- How to measure the GFR?

11-What is the pathogenesis of chronic kidney disease?

What are the structures through which plasma is filtered to form urine?



Urine analysis:

A/C ratio or 24 hours urine proteins

Albuminuria 2000mg/24hr (N < 30mg/24hr).

12- What is significance of albuminuria?

13- What is the Mechanism of Kidney in regulation of Acid Base Balance?

14 a- What do you expect the acid-base status in Magdy?

b- What is the state of Anion Gap in this case?

The doctor advised Magdy to:

- Avoid intake of analgesics
- Diet should be of **low salt** and **low protein** content.

He emphasized on Magdy to follow up after 3 months.

Comment

- He should avoid nephrotoxic drugs.
- Diet low in protien , low in salt for (oedema and hypertension).
- Low in saturated fat and trans fat (hydrogenated oils) as he is dyslipidemic.
- Fluid balance is very important :
- Urine output + 500ml.
- Treat anemia according to the type (mostly will be IDA).
- Treat hypocalcemia with calcium and active vitamin D.
- Frequent follow up till stabilization of the condition.

15- Why did the doctor prescribe lisinopril and insulin?

Take home message

- **Never to take analgesics**
- ***Low salt, low K and low protein diet in patients with kidney disease***
- ***Follow up of blood pressure and blood sugar level***
- ***Guidelines and evidence based medicin***

Thank
you

Stage (also referred to as G1-G5)	GFR*	Description	Treatment
1	90+	Normal kidney function, but urine findings, structural abnormalities or genetic traits suggest kidney disease	Observation, control of blood pressure
2	60–89	Mildly reduced kidney function and other findings (as in Stage 1) point to kidney disease	Observation, control of blood pressure and risk factors
3a	45–59	Moderately reduced kidney function	Observation, control of blood pressure and risk factors
3b	30–44	Moderately reduced kidney function	Observation, control of blood pressure and risk factors
4	15–29	Severely reduced kidney function	Planning for end stage kidney failure. Management of CKD complications such as anaemia
5	<15	Very severely reduced kidney function, called end stage kidney failure	Planning for end stag kidney failure